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home economics **RESEARCH**

IN THE U. S. DEPARTMENT OF AGRICULTURE
PA No. 364

BY WAY OF INTRODUCTION

To put science to work for better everyday living is the assignment of the Institute of Home Economics, a small research agency which is a part of the Agricultural Research Service in the U. S. Department of Agriculture. The work is carried out in three Divisions—the Human Nutrition, the Clothing and Housing, and the Household Economics Research Divisions.

The task of this organization, in one sentence, is to develop through research new knowledge about efficient household management and ways to make best consumer use of food, fiber, and other products of the country's farms.

Three roads to progress are taken in carrying out the assignment:

1. More knowledge is sought about basic needs for food, housing, and other goods and services that figure in everyday living . . . as guidelines for planning by the Nation's families.

2. More knowledge is sought about these goods and services . . . for increasingly effective use of the Nation's resources.

3. Statistical pictures are taken at intervals to show what families buy and use in everyday living . . . to see how the Nation is advancing toward being better fed, housed, clothed.

The research is done in the interest of consumers, particularly homemakers, as other Government agencies aid the farmer, manufacturer, merchant, wage earner. Homemakers in the United States now number about 34,000,000. They are sometimes called the largest occupational group. The degree of their success in buying, and in managing time, energy, and goods has an important bearing on the kind of living that the Nation's families enjoy.

The home economics research staff numbers about 230 employees. Most of them are scientific specialists and their aids, working on the research projects selected for the current program.

Many are home economists, as you might expect, but most of them have an added major or minor in some specialty, such as nutrition, experimental cookery, chemistry, physics, bacteriology, textiles, housing, household equipment, economics, statistics. Specialization is necessary in research.

Besides home economists, the research staff includes men and women who are expertly trained and experienced as chemists, physicists, physiologists, bacteriologists, architects, statisticians.

When new employees are needed, they are obtained from civil-service lists of those who have qualified. The Civil Service Com-

mission, Washington 25, D. C., is always willing to take names and notify applicants when examinations are to be given in their fields. Usually there's an examination for home economists each quarter. College seniors can take this examination, and thus may be on the civil-service list by the time they are graduated.

The Divisions are located partly in downtown Washington, D. C., and partly in Maryland, 16 miles away.

In Maryland, near Beltsville, are the experimental laboratories for work in food and nutrition, textiles and clothing, housing and household equipment. The laboratories are housed in two colonial-style brick buildings in a research center maintained by the U. S. Department of Agriculture.

In Washington, in the Department's South Building, are the offices of the household economics staff, which gathers information by interviewing families in different parts of the country and does its analytical work at desks, typewriters, and calculating machines. Here also are the offices where food-composition data are compiled and summarized.

Other organizations take part in some of the research, either on a cooperative or contract basis. Such arrangements to speed progress are made with Federal and State agencies and also with nongovernmental organizations, such as universities, having specialized personnel and facilities.

And now, let's look into some of the laboratories and workrooms.

In this building and another like it are laboratories for work in food and nutrition, textiles and clothing, and housing and household equipment.

306-A



FOOD AND NUTRITION RESEARCH

What's in a food

In several nutrition laboratories you will see chemists and their aids finding out more about which nutrients are in foods and how much of each the food contain.

In one laboratory members of the staff are studying minerals in foods. They are finding out how much of important minerals such as calcium, sodium, phosphorus, and many others are contained in present-day foods. Figures now available on minerals relate to foods as produced and marketed 40 years or more ago. These workers are finding out what changes modern methods of production, processing, and marketing have made in the mineral content of foods commonly eaten in this country.

In another nutrition laboratory, the staff is measuring amounts of some of the newer B vitamins in foods. A while back, they assayed many foods for folic acid and pantothenic acid to round out research with these vitamins by other scientists. Now they are taking stock of vitamins B₁₂ and B₆. As tools to measure a food's content of these vitamins they choose micro-organisms known to require a particular "B". Into culture tubes they put media adequate for the bacteria's nutritional needs except for the one nutrient being tested—and this is provided by extracts from foods. The more the tiny organisms grow and multiply, the greater the amount of the vitamin in the particular food being studied.

Micro-organisms are at work similarly in the protein chemistry laboratories. In fact, one achievement in these laboratories has been developing and applying microbiological procedures to measure more quickly and easily amounts of amino acids that proteins contain. Twelve of the nutritionally important amino acids in foods have now been determined in this way.

More complete and more exact knowledge about the nutritive values of foods that this research is providing will help those planning diets to evaluate better their adequacy in these important nutrients.

Experimental diets

In the nutrition physiology laboratories, some rooms are occupied by colonies of rats, helping to answer questions about food requirements for growth and for well-being throughout life, or the relative usefulness of different foods for specific purposes. It is increasingly evident that the body is able to use many nutrients in foods only to

a partial extent. Hence, the task of taking a food apart chemically and reporting on its content of key nutrients is often followed by these biological experiments to show true nutritive value.

One of the newer fields of research is the realm where teamwork among nutrients is being studied. It is known that the availability to the body of several nutrients is affected by the nature of the diet; i. e., the kind and amounts of other nutrients present. Recently the staff found that the kind of carbohydrate in the diet affected the body's use of amino acids, and ultimately the body's composition. Rats are now being used to find out the effect of other nutrients on protein requirements.

Food-preservation progress

In the food-preservation laboratories much research has been done to put home canning and freezing on a scientific basis—an important matter to the millions of families in the United States who put up some of their own food. Many use the direction booklets resulting from the work, and others get the same directions quoted in magazines, newspapers, and other means of communication.

Most recent work has been to develop improved formulas for using fully ripe fruits in making jellies, jams, and preserves. Different proportions of fruit and sweetening and different types of commercial pectin on the market were used in the experiments. The end product of this research is an up-to-date booklet giving directions for using fruit to make sweet spreads.

Scientific food preparation

In food-preparation laboratories, you find professional staffs and their helpers weighing, measuring, mixing. They may be experimenting with some food unfamiliar to many homemakers. When young turkeys no bigger than chickens began coming to market, directions for roasting these handy small birds were developed here. When dry milk products became much more plentiful, the staff conducted experiments to provide up-to-date information on reconstituting dry milk and using it in cooking and in mixes, and on ways to use it to put extra milk into meals. At other times the staff may be determining the effect of different household methods of cooking on flavor, tenderness, or yield of a food. To rate foods on eating quality, trained judges from the research staff take time out from other duties to be on judging panels. Objective tests are made also on such points as color or tenderness of a food.

Quality questions

Ups and downs of quality often appear to be linked with differences in feed management of livestock, ways of using insecticides in food production, or temperature of a food during shipment or storage. So, at times, the food-preparation staff undertakes to evaluate the cooking and eating quality of sample lots of food from an experimental farm or other known source. Some of this research on food for the table is done cooperatively with the Department of Agriculture's plant and animal research scientists and market specialists.

Food for many

One kitchen has institution-type cookers, a chef's table, and other equipment for experimental cooking on a large-quantity scale. Here, many recipes for use in school lunch programs are developed. Some research has been aimed at using plentiful foods in new dishes that will appeal to adult tastes—to expand use of these foods in restaurants, hospitals, and other institutions where large numbers are served. Before such recipes are released for general use, not only laboratory judges but restaurants, as well, have tried out a particular dish to test its acceptability.

Many instruments are used to determine the cooking quality of food. Thermocouples attached to a recording potentiometer measure the temperature of turkeys during thawing and cooking as a part of experiments to establish cooking times and procedures.

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In nutrition laboratories rats are used to find out more about the effect on growth and body composition of different food or nutrient combinations.

A viscometer is used to measure viscosity which is an indicator of tenderness in certain cooked vegetables.

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Three stages in a food chemistry experiment on raw and cooked meat. Here the meat is being trimmed, ground, and analyzed for nutritive values.

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Food-composition clearinghouse

Providing up-to-date tables on average amounts of calories, protein, carbohydrates, and key vitamins and minerals that foods provide is the task of a team of nutritionists and food chemists. This group, which compiles scientific findings on food composition, has its headquarters, not at the laboratories in Beltsville, but in the Department's offices in Washington, D. C.

Their work is essential to staff members who conduct family food surveys and calculate nutritive value of food supplies, and to those preparing food-management guides. They serve the public by issuing food-composition tables needed by dietitians, doctors, and others who plan diets. Writers of many textbooks and diet manuals quote the food-composition figures, widening their use further.

The staff bases its tables on worldwide laboratory findings measuring amounts of nutrients contained in man's food. All they can learn about the nutrients in each kind of food is systematically recorded and evaluated to arrive at the best figure for each nutrient. As scientific knowledge advances, the tables become increasingly accurate and complete. Eleven nutrients are now included in the published tables, and the staff looks forward to adding more.

Beyond Beltsville

The foregoing glimpses have offered a sample of food and nutrition research in the Department's own laboratories and workshops. To round out the picture, here are a few examples of work being done cooperatively or by contract to speed the research program.

In Texas, fatty acids—among the less understood, yet important, nutrients—are being studied to find out the amounts and kinds that children need for normal growth and development.

Fatty acid content of foods is being determined under contract in several locations. These data will be compiled and published as reference tables for use in estimating the fatty acid content of food supplies and diets.

Research organizations in seven Southern States and the Human Nutrition Research Division are cooperating in a study to gain scientific facts about the metabolic response of preadolescent girls to a diet of commonly served foods that supply nutrients at approximately the levels suggested by the National Research Council.

Minnesota, Oklahoma, Alabama, and Nebraska are using a reference diet, developed and tested in the Human Nutrition Research Division,

in metabolic studies with young women which will advance understanding of human nutritional requirements and availability to the body of nutrients in foods.

TEXTILE AND CLOTHING RESEARCH

Fabrics to fit needs

In the textile and clothing laboratories facts about fabrics are sought for two-way advantage: To help homemakers select fabrics to suit different purposes; to give the textile industry guidance in meeting consumer needs.

For some of this work the weather must be controlled. So, double-protecting doors lead into an air-conditioned room where instruments are used to measure fabrics' physical properties such as breaking strength, stretch, resistance to rubbing, air permeability, and other characteristics. You might find scientists at work with samples of cotton knit goods or other materials woven to specification using yarns of different size and number per inch. Chemical properties of modern cottons and other fabrics, many treated with special finishes for specific uses, are also determined.

Laboratory tests help to predict suitability of fabrics for specific uses. Actual wear experiments are needed however to determine which aspects of serviceability are most important to specific uses and what laboratory tests best serve the purpose of predicting or measuring performance in use. Thus, for months a rug of many colors has been walked on by customers in line in the research center cafeteria. The rug is really strips of cotton broadloom being used in evaluating soil-resistant finishes and cleaning procedures. Chair seat covers of cotton and other fabrics are also undergoing in-service tests in the cafeteria. Cotton undergarments are in actual use by children in a boarding house. Shirts are being worn by a group of college men in a study of the serviceability of different weaves of cotton shirtings.

Fabric care

In textile chemistry laboratories, home laundering problems are getting attention. Recently completed were experiments to determine efficiency of different detergents in removing soil and their effect on the varied fabrics now on the market. Chemists, working with equipment specialists, are now finding out how effective various bleaches are in preventing yellowing of cotton fabrics in the home laundering process.

Amounts of certain disinfectants that are adsorbed by cotton and wool fabrics under varying conditions are being determined in the bacteriology laboratory. Using procedures recently developed in these laboratories, studies are being made of the germicidal activity of products commonly used in treating diapers, bed linens, and other household articles.

Putting findings to use

To put the findings to use one specialist may be surrounded by swatches of fabrics and notes and records about fabrics. She is working on one of the publications to be issued by the Institute to help consumers decide the types of materials and the quality of workmanship that best serve their clothing needs. Many facts about fabrics important to consumers are learned from the laboratory and serviceability studies of the Clothing and Housing Research Division or of other research groups. To prepare for writing the publication, the specialist also has visited shops, casting an experienced eye over construction details of garments at varying prices. She may visit factories to learn more about production methods that affect values important to the consumer. She has brought samples of fabrics or garments to the laboratory to examine construction points that customers can't see or may not notice but that have a bearing on their serviceability, comfort, and appearance.

Findings from textiles and clothing research are used by manufacturers as well as consumers but in different ways. Bulletins are used for training buyers and salespeople, and manufacturers use them as guides in preparing the factual labels they attach to clothing.

HOUSING AND HOUSEHOLD EQUIPMENT RESEARCH

Experimenting with space and energy

As you enter the housing laboratories you come upon specialists experimenting with space and energy, to enable home planners to make homes more convenient to work in, more comfortable to live in.

Recently these workers, through experiments in a laboratory kitchen, arrived at recommendations for counter space that should be provided in homes where food preservation is an important activity. They also determined adequate space needed for storing canned foods, canning equipment, and household textiles in farm homes.

Currently these housing specialists, working cooperatively with several State experiment stations, are finding out how much space is

A chemist extracts natural soil from samples of used and laundered sheets—one part of a study in which yellowing of white cotton fabrics during use is being investigated.

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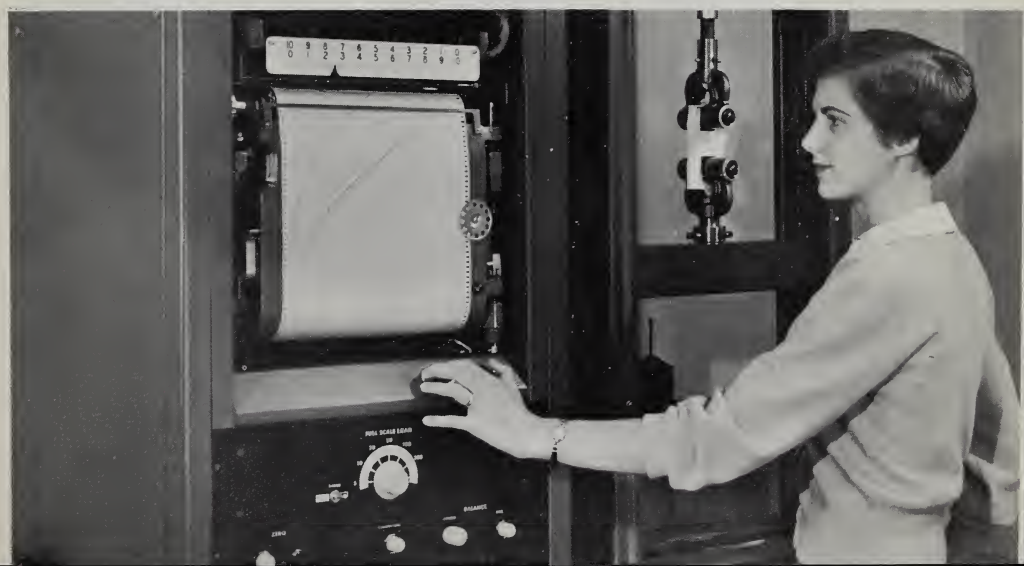
The color-difference meter measures the color changes in fabrics due to laundering—fading of dyed fabrics, graying and yellowing of white goods, and special fluorescence effects of whiteners to mask yellowness.

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The breaking strength and elongation of a fabric is measured by a high precision electronic tensile testing instrument.

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needed around household equipment and furniture for most efficient and effective use and care by homemakers. Measurements are recorded as homemakers perform household tasks involving use and care of major kitchen equipment or furniture.

Also in progress in these laboratories is research to compare the energy costs of using equipment and storage facilities of different designs and arrangements, different types of equipment, and different methods of work.

Space needs and energy requirements determined in these studies will provide for improved kitchen and house designs.

Kitchens designed

Developing kitchens that provide maximum convenience for the homemaker at her work is a continuing project of the housing research staff. Newest product of their research is an energy-saving kitchen and workroom, designed primarily for farm women who must conserve energy because of age or physical disability. Many able-bodied homemakers will also welcome the many features to save time and energy in this kitchen.

In designing the kitchen, results of recent research on energy costs of performing household tasks and on space needs for housework were incorporated throughout. The storage designs, workspace, and arrangements of equipment are planned to cut to a minimum the energy cost of kitchen activities.

For families interested in building such a kitchen, construction drawings were prepared for distribution through a regional plan service.

House plans in the making

Farm houses, more than city houses, are headquarters for many work activities and take special planning, if they are to combine efficiency and comfort. Yet few architects specialize in such plans. To provide farmhouse plans suited to different family requirements and sections of the country, the Department of Agriculture and the States together maintain the regional plan service and the home economists share in this.

Equipment performance

From research on the operating characteristics of home equipment come recommendations on their use and care. In one series of experiments, modern laundry equipment is being used for laundering the

newer types of fabrics to find out how different washing procedures and drying methods affect each fabric. From such research will come recommendations that require a minimum of time and energy for laundering present-day fabrics, that make as full use as possible of equipment, and at the same time satisfactorily clean fabrics without damage to their appearance and wearing qualities.

A portable respirometer worn by the laboratory worker in this picture is measuring the energy needed to place a 5-pound load on kitchen storage shelves at various heights from the floor.

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This energy-saving kitchen incorporates results of research on energy expended for various household tasks and on space needs for housework.

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HOUSEHOLD ECONOMICS RESEARCH

The family economics staff is mainly concerned with reporting how the rural families are living and how well the Nation's families are fed, and with making recommendations for better diets.

Families' food

Food economists are learning about present-day family food practices from information obtained in interviews with some 6,000 families living in rural and urban areas. The mass of figures from the survey provides information on expenditures and quantities consumed of about 400 different foods, on food canned and frozen at home, home food production, and home baking practices.

Evaluations of nutritive quality of diets made possible by surveys of this kind help to locate the population groups most in need of nutritional improvement and to point out weak spots in diets. This most recent study shows that calcium and vitamin C are the nutrients most likely to be short in family food among both city and rural people. The need for greater use of milk, the main calcium source in the food supply, and of the vitamin C rich fruits and vegetables, such as citrus and tomatoes, is indicated. A comparison with a nationwide survey made about 20 years ago shows a considerable improvement in the nation's diets during the period.

Guides to good nutrition

As one means of helping families to improve diets and to get good returns for their food money, food economists develop lists of food quantities that provide for nutritional needs at different cost levels. They take into account survey findings showing what people eat, food costs, data on the nutrients foods contain, and the amounts of nutrients that meet human needs. From time to time, they revise these family guides to good nutrition to keep in line with advances in nutrition knowledge and changes in prices and food habits.

The guides on food management are widely used by families and by teachers and extension and social workers. Several times a year the cost of these diet plans are refigured and results made available to home economists and others in these programs.

Consumer-education aid

Assembling dependable information on a particular subject has long been a problem for extension leaders, teachers, writers, and others engaged in nutrition or other consumer education programs. A few years back food economists on the household economics staff began compiling source material on specific foods, and a series of booklets resulted that deal with specific commodities—tomatoes, peaches, beef, pork, milk, bread, and potatoes. They provide facts on nutritive value, food value for money spent in comparison with other foods, seasonality of supplies, selection and use of different varieties, grades, and forms, and use in family meals.

More recently the staff began a rounding up and evaluation of information on some selected food and nutrition problems which will be issued in a series of publications that will provide background facts for nutrition education programs. The first of these, "Essentials of an adequate diet," is providing much information for use by nutrition teachers. Based on examinations of current dietary habits, the nutritive value of foods, and research findings on human need for these nutrients, the bulletin shows the essential points to watch in planning a good diet.

Rural family living

To find out how farm families are faring in providing for their wants and needs is another assignment of this group of family economists. From a recent nationwide survey of almost 4,000 farm families, up-to-date information was obtained on amounts farm families spend for such items as food, clothing, housefurnishing, and medical care, and how much these families produce for themselves on the home farm. The research staff will use information from this study and other available data on family spending to develop budget guides needed by home economists engaged in teaching, family counseling, social welfare, and extension work.

A standing date each autumn calls for family economists to take part in the family-living programs included in the Department's Agricultural Outlook Conference. The Conference brings to Washington extension specialists from all parts of the country. The research staff brings together for this group the latest available evidence on family living—from their own surveys of farm family expenditures and from Census and other Government sources. Picture-and-graph charts are used to present many of the economic trends in rural living, from home improvement to medical care.

GETTING OUT THE FACTS

Findings take many forms

Getting findings ready for public appearance is the last step in the research on ways to improve homemaking and ways to use products from the land more effectively. This is where the Department's specialists in information techniques join with the research scientists. Publications take on such varied forms as printed bulletins, educational charts, press releases, radio scripts, filmstrips, occasional motion pictures and television programs.

The staff approaches each research report with the question: Who will use these facts? Are they for research scientists? Or will they be most useful to teachers, extension leaders, and other professional home economics groups? Or are there practical points to give directly to homemakers from coast to coast? Sometimes the same research project provides highly technical data for one audience, and homely how-to-do-it directions for another.

Suppose the food laboratories have new research results on home freezing to present. A group of writers, editors, artists, and layout specialists pool their know-how to help the scientists put the new facts into clear directions for homemakers, and line up step-by-step picture sequences to demonstrate how to proceed. With format, paper, and type decided, a bulletin is shaped up for the printer.

Plans for press pictures might be going forward, too, featuring a capable, attractive woman using the new technique against a home-kitchen background. A visual specialist might be figuring how to make these same pictures into a filmstrip for teachers to use, and thinking ahead of how to use them on television. Before publication time, a writer would turn out a press story to go to editors of magazines, women's pages in newspapers, and women's program directors on radio and TV. Meanwhile, the editors would be reviewing a manuscript of the research report to get it into form for publication as a technical bulletin or as a contribution to a scientific journal.

How many bulletins?

Records for the past 35 years show that more than 150,000,000 copies of printed bulletins from the human nutrition and home economics research have been distributed. The bulletin on home canning of fruits and vegetables, through many editions, has totaled 12,000,000 copies; the stain-removal bulletin nearly 6,000,000. In current circulation are about 150 technical and popular publications printed by the Government press. In addition, many research reports are printed in scientific journals.

HISTORY HIGHLIGHTS

How home economics research evolved

In 1894 began the United States Government's research in human nutrition. That year, the Congress appropriated \$10,000 "to enable the Secretary of Agriculture to investigate and report upon the nutritive value of the various articles and commodities used for human food, with special suggestions of full, wholesome, and edible rations, less wasteful and more economical than those in common use." Planning a program was entrusted to Dr. W. O. Atwater, director of the Department's experiment station work. His own research was in nutrition, and so comprehensive and clear were the goals which he set for the Government's nutrition investigations that the Department still steers by them.

In 1915, from this nucleus of nutrition research, an Office of Home Economics was organized. This was done in response to demand of extension workers for more scientific facts in nutrition and other phases of home economics. The Smith-Lever Act of 1914 had opened the way for a nationwide program of home demonstration work, but at every turn the leaders were confronted by questions they could not answer.

A bureau established

During World War I, pressure increased for more help on home problems and the Nation became aware of the practical value of scientific knowledge on food and nutrition in a world crisis. On July 1, 1923, the home economics unit in the Department of Agriculture was given the responsibilities and dignity of Bureau status. The new Bureau of Home Economics ranked in administrative level with other bureaus doing research in animal and plant production, and was responsible directly to the Secretary of Agriculture.

Changes in name and leadership

In 1943, during another world conflict in which nutrition and economical use of food, clothing, and other supplies became a paramount issue, a change was made in the Bureau's organization and name. Protein chemistry research directly related to nutrition in another branch of the Department, was merged with the nutrition work in the home economics laboratories, and Bureau of Human Nutrition and Home Economics was the name given for the whole.

These changes followed soon after establishment of the Agricultural Research Administration, which brought together within the Department a number of agencies whose chief assignment was advancing

scientific knowledge on production and use of food, fiber, and other products of the land. The Bureau of Human Nutrition and Home Economics became an integral part of that group.

Reorganization of the Department in 1953 brought new designations. The Agricultural Research Administration became the Agricultural Research Service. The work formerly done in the Bureau of Human Nutrition and Home Economics was assigned to three research branches under a Director of Home Economics Research. The three branches were Clothing and Housing, Household Economics, and Human Nutrition. Further realignment in the Agricultural Research Service in February 1957 brought together in an Institute of Home Economics the Department's home economics research, organized into three divisions: Clothing and Housing Research Division, Household Economics Research Division, and Human Nutrition Research Division.

SOME WORK ACCOMPLISHED

What progress has been made in home economics research in the U. S. Department of Agriculture over the past 35 years? The record shows much pioneering, many far-reaching tasks completed or advanced. Among highlights that rate mention are the following examples of accomplishments by this small group of research workers.

1927—Pioneered in working out procedures to evaluate performance of home refrigerators—incorporated in the American standard test procedure now used by manufacturers and testing laboratories.

1928—Began studies of fabric serviceability, with laboratory measurement of physical properties and actual-use trials.

1928-31—Pioneered in developing self-help and other functional principles in designs for children's clothing.

1931—Gave homemakers time-and-temperature directions for cooking meats of different cut and quality, based on extensive experiments.

1933—Produced family food plans at four spending levels, as a flexible guide to good nutrition, whatever the family income and the ages and activities of the members.

1933—Began to take part in the Department of Agriculture's annual Outlook Conference—briefing home-management specialists on economic progress and problems of rural families.

1934—Shared in the Department's first survey showing conditions of farmhouses.

1935-37—Joined with other agencies to gain the first comprehensive picture of American family spending and saving and dietary levels—the Consumer Purchases Study.

1937-40—took scientific measurements of 147,000 children and about 15,000 women for improved systems of sizing clothes.

1939—Determined vitamin A requirements of adults.

1939—Determined thiamine content of about 100 foods—the first systematic analysis using a pure crystalline vitamin as a standard.

1940—Developed designs for women's work clothes, setting high standards for comfort, efficiency, and safety, which stimulated industry to launch a new branch of women's wear.

1940—Began laboratory work on deterioration of household textiles due to micro-organisms. One result: 3 public service patents.

1941—Published the first simple daily nutrition guide to win nationwide acceptance.

1942—Cooperated in a nationwide survey of family spending and saving in wartime.

1942-45—Provided facts to assist those responsible for wartime guidance to families in conserving food, clothing, and equipment.

1942—Began an annual estimation of nutritive value of the national per capita food supply.

1944-52—Developed microbiological methods for economical and rapid assay of the 10 so-called essential amino acids.

1946—Reported wide differences in extent to which carotenes of yellow and green vegetables can be used for vitamin A needs.

1946—Completed research which put home canning on its own scientific basis, replacing earlier adaptations of industrial research.

1947-49—Cooperated in four regional surveys to determine housing features that farm families want and to provide facts on household activities, essential to establishing space needs for work and storage.

1948—Determined effects of household cooking methods on vitamin and mineral content of 20 commonly used foods.

1948—Made clothing and food consumption studies, and extensive regional cooperative studies on nutritional status of individuals in relation to diet.

1948—Designed a step-saving kitchen, which aroused wide national and international interest among homemakers, equipment manufacturers, and architects.

1950—Published comprehensive new tables of food composition summarizing knowledge on the nutritive value of 750 food items.

1951—Began coordinated research with the States to determine space requirements for household activities as a basis for improved kitchen and house designs.

1951—Reported amounts of folic acid—one of the newer B vitamins—in several hundred familiar foods.

1952—Took leadership in a National Food and Nutrition Institute for 400 persons from public and private agencies to appraise progress in nutrition and plan for improved programs.

1953—Advanced understanding of human needs for unsaturated fatty acids, through experimental work under contract.

1953—Used geometric principles to arrive at a formula for predicting and controlling shrinkage in knit fabrics.

1955—Developed a standardized reference diet for a research tool in human metabolic studies.

1955—Took leadership in Department survey of household food consumption and dietary levels, covering a nationwide sample of 6,000 families.

1956—Provided the first data indicating the quantitative requirements of young women for eight of the essential amino acids.

1956—Designed an energy-saving kitchen, the first to incorporate results of research on energy and space requirements for kitchen activities derived from coordinated research with several States.

1956—Developed a new and simplified guide to selection of nutritious meals, based on recent research on food habits, nutritional needs, and nutritive value of foods.

1956—Published pantothenic acid values for 237 foods, determined by an improved method developed in the laboratory.

1957—Sponsored, with Department's Nutrition Committee and Interagency Committee on Nutrition Education and School Lunch, a national conference to make nutrition education more effective.

1957—Published the first USDA tables of amino acids in foods.

1957—Published the first summary of heights and weights of U. S. children.

DN-1234

Cover Illustration—Using the electrophoretic apparatus to analyze blood proteins

Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

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